CENTRORHYNCHUS PINGUIS N. SP. FROM CHINA*

H. J. VanCleave

The Acanthocephala, as a group, have a very broad geographical distribution. Practically every country, the fauna of which has been studied, has revealed considerable numbers of these worms parasitic in the various classes of its vertebrates. In going over the literature upon this group the writer has found no reference of any kind to their occurrence in China. This is probably due to the incompleteness of the published records concerning the fauna of that country and does not necessarily indicate any actual scarcity of Acanthocephala. In 1915 Dr. R. T. Shields sent material from the intestine of a magpie at Nanking, China, to Professor Henry B. Ward, who kindly turned them over to the writer for study. A study of stained whole mounts and of serial sections has demonstrated the fact that these individuals belong to a new species of the genus Centrorhynchus which is described below.

Centrorhynchus pinguis nov. spec.

With the characters of the genus VanCleave (1916-a). Body robust, with anterior half slightly inflated. Entire length about 15 mm.; maximum diameter in anterior third of body, about 2.5 mm.; diameter in posterior attenuated third about 1.2 mm. Proboscis about 0.77 mm. long; region anterior to insertion of proboscis receptacle ovoid, about 0.48 mm. long by 0.38 mm. in diameter; posterior to insertion of receptacle a truncated cone with the base at the line of union with body proper. Proboscis armed with about thirty-two longitudinal rows of about sixteen hooks each. Embryos 48 to 65μ long by 24μ in diameter; elliptical, with the three membranes concentric. Males not observed.

Host: Magpie, in intestine. Locality, Nanking, China. Type female deposited in Parasitological Collection of the University of Illinois; catalog number 18.1. Paratypes in collection of the writer.

The specimens available for this study were preserved in formalin and tho evidently killed in the same reagent, were in splendid histological condition. In toto-mounts the marked translucency of structure characteristic of formalin specimens was of great value in permitting a close examination of internal structures. However,

---

* Contributions from the Zoological Laboratory of the University of Illinois, No. 121.

some of the finer points of structure were determined from a series of longitudinal sections.

The proboscis receptacle (Fig. 7) is distinctly of the type characteristic for the genus Centrorhynchus. It is a sac shaped structure 1.3 mm. long, inserted near the middle of the prosboscis and gradually diminishing in size toward its posterior extremity where it ends in a small, bluntly rounded termination. The walls of this organ are composed of two concentric layers of muscle of which the outer has a thickness of about 12μ, while the inner layer is two or three times as thick. The large invertors (*ip*) of the proboscis fill practically the entire space within the receptacle. Near the middle of the receptacle the invertors are separated by the brain (*br*), which in this species is an ovoid mass about 0.17 mm. long and 0.07 mm. broad located about 0.4 mm. anterior to the posterior tip of the receptacle. Within the brain the individual ganglion cells are ovoid in shape with a length of 41μ and a breadth of 30μ. The nuclei in these cells are very conspicuous, having a diameter of about 15μ. Fibers from the invertors of the proboscis pass through the wall of the receptacle in the region near its posterior tip and continue through the body cavity as the retractors of the proboscis receptable (*pr*).

The body wall (Fig. 5) presents a type of structure similar to that described by the writer (1916: 170) for Arhythmorhynchus. The high degree of development of the muscle layers (*bm*) gives the body wall in this species a peculiar appearance closely simulating that of a parenchyma. The similarity is heightened by the presence of numerous embryos (*e*) which have found their way from the body cavity proper (*bc*) into the meshwork of this loosely organized tissue. In the paper referred to above, the writer called attention to the similarity existing between the fundamental structure of the muscle cells of nematodes and of members of the genus Arhythmorhynchus. In *Centrorhynchus pinguis* this similarity is even more striking. Figure 6 shows the structure of a single muscle cell taken from a longitudinal section through the body wall. Each such cell is comprised of two distinct regions: a sac of undifferentiated cytoplasm (*cm*), containing the nucleus (*n*); and at the opposite end of the elongated cell a group of differentiated muscle fibrillae (*mf*). In the cells under consideration the fibrillae are restricted in their distribution to the margin of the cells contiguous to the subcuticula. In the muscle cells shown in Figure 5 these cells have been cut in an oblique plane so that only the fibrillar portion of each cell is shown. It should be kept in mind in this connection that the usual arrangement of the body muscle layer in Acanthocephala is such that the nuclei all lie in the dorsal region of the body. Here they occur in two more or less sharply defined

longitudinal rows. In one tangential section through a muscle cell of *C. pinguis* the writer has observed two nuclei within the same muscle cell, lying some distance apart, indicating the possibility that either the muscles of the two sides of the body are derived from large binucleate cells or are possibly the result of a fusion of the cells from the two sides of the body.

Internally, the proboscis shows a differentiation in the structure of its wall which bears a rather direct relationship to the division into anterior and posterior regions separated by the line of insertion of the proboscis receptacle. The external marking off into regions and the internal differences in structure do not, however, coincide, precisely. The wall of the anterior proboscis region is thicker and more distinctly fibrous in structure than is the wall of that part of the proboscis posterior to the insertion of the proboscis receptacle (Fig. 7). In the anterior region conspicuous groups of fibers run across the wall. The association of these fibers with the well developed root processes upon the hooks in the same region indicates a probable greater degree of freedom of movement of the hooks anterior to the insertion of the receptacle than of those in the posterior region of the proboscis.

Hooks upon the proboscis (Fig. 2) are distinctly of two types. Those anterior to the insertion of the receptacle are heavy, with conspicuous reflexed root processes, while those posterior to the insertion are more spine like and rarely possess true root processes. In these latter the basal portion of the hook or spine is embedded in the proboscis wall and alone serves for connection with that organ. The largest hooks upon the proboscis are strongly recurved, 53μ long, and with a diameter of 18μ at the point where they emerge from the proboscis wall.

The female genital tract is, in most individuals, completely obscured by the accumulation of embryos in the posterior body region. One female, stained and mounted in toto, gave a very clear view of the relations of the parts of the female genital organs as shown in Figure 4. The embryos in this species (Fig. 3) while covered with fully formed membranes display considerable degree of variability in size.

SUMMARY

The description of *Centrorhynchus pinguis,* nov. spec. from the intestine of a magpie from China furnishes apparently the first record of the occurrence of Acanthocephala in China. In discussing the morphology of *C. pinguis* especial attention is given to the cellular elements of the body musculature.

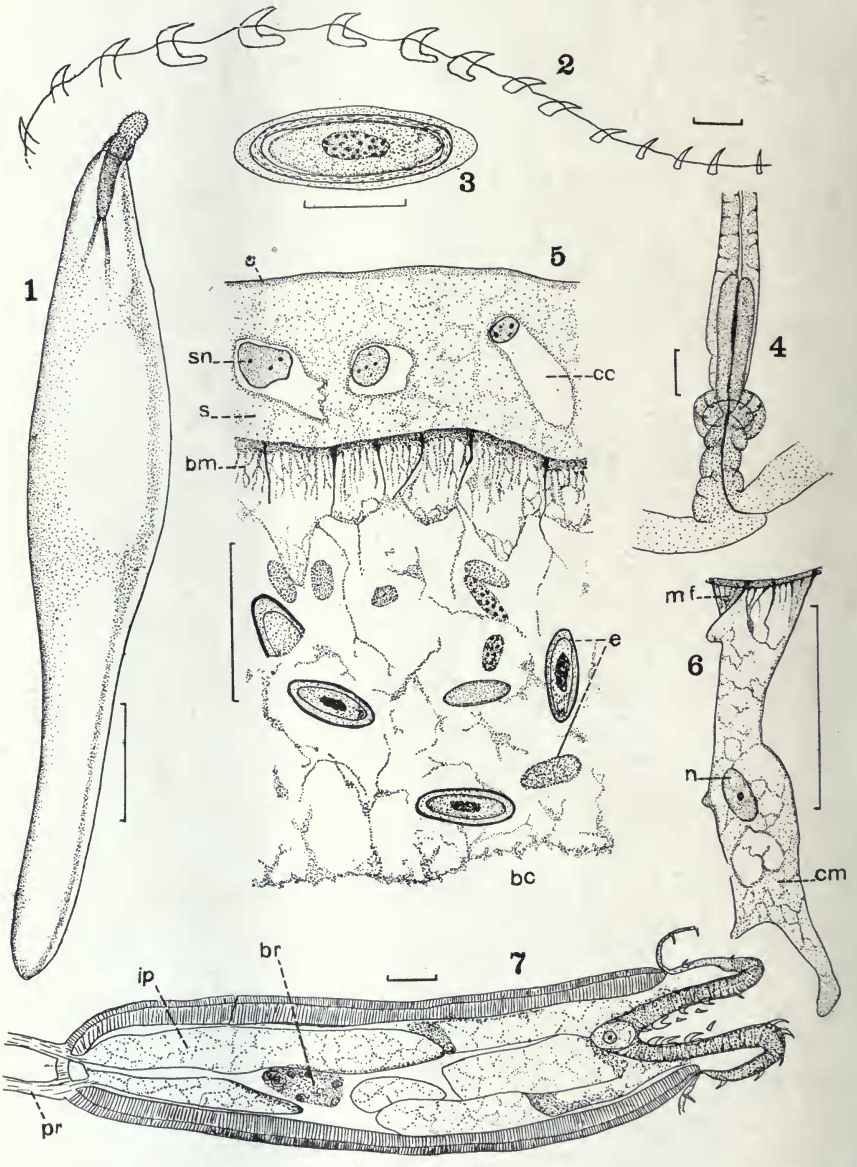

PLATE III

Literature Cited

Lühe, M. 1911. Die Süsswasserfauna Deutschlands, Heft 16: Acanthocephalen. Jena. 116 pp.

VanCleave, H. J. 1916. A Revision of the Genus Arhythmorhynchus, with Descriptions of Two New Species from North American Birds. Jour. Parasitol., 2: 167-174.

1916a. Acanthocephala of the Genera Centrorhynchus and Mediorhynchus (new genus) from North American Birds. Trans. Amer. Micr. Soc., 35: 221-232.

Explanation of Plate

All drawings were made with the aid of a camera lucida. The magnification of each figure is indicated by the reference line accompanying it which has the value of 0.1 mm., except that in Figure 1, it has the value of 2 mm., and in Figure 3 of 0.02 mm.

Morphology of *Centrorhynchus pinguis* nov. spec.

Fig. 1.—Type female showing general body form. From toto mount stained in Ehrlich's acid hematoxylin and mounted in damar.

Fig. 2.—Profile of proboscis of type female, showing a single longitudinal row of hooks.

Fig. 3.—Embryo from body cavity of female. Drawn from a longitudinal section of body.

Fig. 4.—Genital tract of female, from toto mount. The anterior end, including the selective apparatus, hidden from view in specimen by accumulation of embryos within body cavity.

Fig. 5.—A portion of body wall from longitudinal section. *bc,* body cavity; *c,* cuticula; *cc,* circular canal of lacunar system; *bm,* body musculature; *e,* embryo; *s,* subcuticula; *sn,* subcuticular nucleus.

Fig. 6.—A single muscle cell, drawn from longitudinal section of body wall. *cm,* undifferentiated cytoplasmic mass; *mf,* muscle fibrillae; *n,* nucleus.

Fig. 7.—Section through inverted proboscis and proboscis receptacle. *br,* brain; *ip,* invertor of proboscis; *pr,* retractor of proboscis receptacle.